

FORM PTO-1390
(REV. 12-2001)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

1386/6

U.S. APPLICATION NO. (If known, see 37 CFR 1.5

10/070112

INTERNATIONAL APPLICATION NO.

INTERNATIONAL FILING DATE

PRIORITY DATE CLAIMED

PCT/AU00/00945

09 August 2000 (9.08.00)

30 August 1999 (30.08.99)

TITLE OF INVENTION

FLUID RECOVERY SUCTION HEAD

APPLICANT(S) FOR DO/EO/US OLSEN, Garry Roy

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

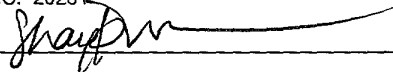
1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☐ is attached hereto (required only if not communicated by the International Bureau).
 - b. ☒ has been communicated by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
 - a. ☐ is attached hereto.
 - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
 - b. ☐ have been communicated by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☒ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☒ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
14. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
15. ☐ A substitute specification.
16. ☐ A change of power of attorney and/or address letter.
17. ☐ A computer-readable form of the sequence listing in accordance with 37 CFR 1.82.
18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. ☒ Other items or information:

"Express Mail" mailing number EV023031641 USDate of Deposit 28 Feb. 2002

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail to Addressee" service under 37 C.F.R. 1.10 on the date indicated above and is addressed to the Commissioner for Patents, Washington, D.C. 20231
Shay E. Dunn



Copy of PCT Publication; copy of International Preliminary Examination Report; copy of PCT/IB/308; copy of PCT/IB/306; copy of International Search Report

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)

INTERNATIONAL APPLICATION NO.

ATTORNEY'S DOCKET NUMBER

10/0/0112 PCT/AU00/00945

1386/6

21. ☒ The following fees are submitted:**BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)):**

Neither international preliminary examination fee (37 CFR 1.482)
nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO
and International Search Report not prepared by the EPO or JPO \$1040.00

International preliminary examination fee (37 CFR 1.482) not paid to
USPTO but International Search Report prepared by the EPO or JPO \$890.00

International preliminary examination fee (37 CFR 1.482) not paid to USPTO
but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$740.00

International preliminary examination fee (37 CFR 1.482) paid to USPTO
but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$710.00

International preliminary examination fee (37 CFR 1.482) paid to USPTO
and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00

ENTER APPROPRIATE BASIC FEE AMOUNT =**CALCULATIONS PTO USE ONLY**

\$ 1,040.00

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30
months from the earliest claimed priority date (37 CFR 1.492(e)).

\$ 0.00

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	\$
Total claims	28 - 20 =	8	x \$18.00	\$ 144.00
Independent claims	3 - 3 =	0	x \$84.00	\$ 0.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$280.00	\$ 0.00

TOTAL OF ABOVE CALCULATIONS = \$ 1,184.00

☒ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above
are reduced by 1/2. + \$ 592.00

SUBTOTAL = \$ 592.00

Processing fee of \$130.00 for furnishing the English translation later than ☐ 20 ☐ 30
months from the earliest claimed priority date (37 CFR 1.492(f)).

\$ 0.00

TOTAL NATIONAL FEE = \$ 592.00

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be
accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +

\$ 0.00

TOTAL FEES ENCLOSED = \$ 592.00Amount to be
refunded: \$

charged: \$

- a. ☒ A check in the amount of \$ 592.00 to cover the above fees is enclosed.
- b. ☐ Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees.
A duplicate copy of this sheet is enclosed.
- c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any
overpayment to Deposit Account No. 50-0426 A duplicate copy of this sheet is enclosed.
- d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card
information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR
1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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25297

PATENT TRADEMARK OFFICE

SIGNATURE

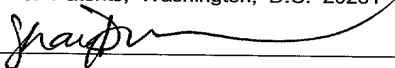
Arles A. Taylor, Jr.

NAME

39,395

REGISTRATION NUMBER

"Express Mail" mailing number EV023031641US
Date of Deposit 28 Feb. 2002
I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail to Addressee" service under 37 C.F.R. 1.10 on the date indicated above and is addressed to the Commissioner for Patents, Washington, D.C. 20231
Shay E. Dunn



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Olsen, Garry Roy

Group Art Unit: Not Assigned

Serial No.: Not Assigned

Examiner: Not Assigned

Filed: Herewith

Docket No.: 1386/6

For: FLUID RECOVERY SUCTION HEAD

PRELIMINARY AMENDMENT

Commissioner for Patents
BOX PCT
Washington, D.C. 20231

Dear Sir:

Kindly amend the subject application as follows:

IN THE CLAIMS:

Please delete the paragraph heading on page 10 of the Annex to PCT/IPEA/409, before claim 1, and insert in place thereof as follows:

-- What is claimed is: --.

Please amend claims 5-14 as presented on pages 10-12 of the Annex to PCT/IPEA/409 as follows:

5. (Amended) The suction head according to claim 1, wherein said one end of said passage opens onto said upper planar surface.

6. (Amended) The suction head according to claim 1, further including a filter supported in said base through which said flowable substance must pass when travelling from said slots into said passage.

7. (Amended) The suction head according to claim 6, further including an annular seat formed adjacent and radially outward of said outer edge of said recess.

8. (Amended) The suction head according to claim 7, wherein said filter is seated in said annular seat and said suction head further includes a retaining member for retaining said filter in said annular seat.

9. (Amended) The suction head according to claim 8, wherein said retaining member is a clip or ring dimensioned to fit with a snap fit or an interference fit in said annular seat.

10. (Amended) The suction head according to claim 1, further including an impeller seated in said recess.

Serial No.: Not Yet Assigned

11. (Amended) The suction head according to claim 1, further including a non-return valve provided within, or in fluid communication with, said passage between said one end and a vacuum source or negative pressure source to which said suction head can be connected.

12. (Amended) The suction head according to claim 1, wherein said base is circular.

13. (Amended) The suction head according to claim 1, wherein said slots extend in a radial direction.

14. (Amended) A liquid recovery system for recovering a flowable substance from a surface or container, said system comprising at least:

a suction head in accordance with claim 1 and,

a vacuum or negative pressure source coupled to said opposite end of said passage to provide a vacuum or suction source for drawing said substance through the slots and hold and directing the drawn substance to a waste collection or disposal means.

Please add the following claims:

19. (New) A suction head for lifting a flowable substance from a surface, said suction head including at least:

a base for placement on the surface, the base having a radially outer peripheral edge;

a recess formed centrally in the base and having an outer edge inboard of said radially outer peripheral edge of said base;

a plurality of slots formed in said base extending from said radially outer peripheral edge of said base to said outer edge of said recess; and

a passage having one end that opens onto said recess and an opposite end adapted for connection to a vacuum source or a negative pressure source, said one end located inboard of said outer edge of said recess.

20. (New) The suction head according to claim 19, wherein said slots have a collective width substantially equal to or in the same order of magnitude as a diameter of said outer edge of said recess.

21. (New) The suction head according to claim 20, wherein said slots have a collective depth substantially equal to or in the same order of magnitude as the diameter of said one end of said passage.

22. (New) The suction head according to claim 21, wherein said recess includes a planar upper surface which is inclined relative to a horizontal reference plane.

23. (New) The suction head according to claim 23, wherein said upper surface has an incline in the order of 1:3.

24. (New) The suction head according to claim 23, wherein said one end of said passage opens onto said upper planar surface.

Serial No.: Not Yet Assigned

25. (New) The suction head according to claim 24, further including a filter supported in said base through which said flowable substance must pass when travelling from said slots into said passage.

26. (New) The suction head according to claim 25, further including an annular seat formed adjacent and radially outward of said outer edge of said recess.

27. (New) The suction head according to claim 26, wherein said filter is seated in said annular seat and said suction head further includes a retaining member for retaining said filter in said annular seat.

28. (New) The suction head according to claim 1, further including an impeller seated in said recess.

REMARKS

The amendments to the claims as set forth above are intended to remove all multiple dependent claims from the subject application and to more particularly point out and distinctly claim the subject matter of the invention.

Attached hereto is a marked-up version claims 5-14, along with new claims 19-28, which illustrates all of the changes made to the specification and claims pursuant to 37 CFR § 1.121. The attached page is captioned "Version With Markings To Show Changes Made". Deleted language is bracketed and added language is underlined.

It is respectfully requested that examination begin in the United States on the subject Application as amended under Article 34 during the International phase and as further amended in this Preliminary Amendment.

The Commissioner is hereby authorized to charge any deficiencies or credit any overpayments in connection with the filing of this correspondence to Deposit Account No. 50-0426.

Respectfully submitted,

JENKINS & WILSON, P.A.

Date: 02/28/2002

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1386/6

AAT/lsg/bss

Enclosures

Version With Markings To Show Changes Made

IN THE CLAIMS:

The paragraph heading on page 10 of the Annex to PCT/IPEA/409, before claim 1, has been deleted and the following has been inserted in place thereof as follows:

What is claimed is:

Please amend claims 5-14 as presented on pages 10-12 of the Annex to PCT/IPEA/409 as follows:

5. (Amended) The suction head according to [any one of] claim[s] 1 [to 4], wherein said one end of said passage opens onto said upper planar surface.
6. (Amended) The suction head according to [anyone of] claim[s] 1 [to 5], further including a filter [means] supported in said base through which said flowable substance must pass when travelling from said slots into said passage.
7. (Amended) The suction head according to [anyone of] claim[s] 1 to 8] 6, further including an annular seat formed adjacent and radially outward of said outer edge of said recess.
8. (Amended) The suction head according to claim 7, wherein said filter is seated in said annular seat and said suction head further includes a retaining [means] member for retaining said filter in said annular seat.
9. (Amended) The suction head according to claim 8, wherein said retaining [means] member is a clip or ring dimensioned to fit with a snap fit or an interference fit in said annular seat.
10. (Amended) The suction head according to [anyone of] claim[s] 1 [to 9], further including an impeller seated in said recess.
11. (Amended) The suction head according to [anyone of] claim[s] 1 [to 10], further including a non-return valve provided within, or in fluid communication with, said passage between said one end and a vacuum source or negative pressure source to which said suction head can be connected.
12. (Amended) The suction head according to [anyone of] claim[s] 1 [to 11], wherein said base is circular.
13. (Amended) The suction head according to [anyone of] claim[s] 1 [to 12], wherein said slots extend in a radial direction.
14. (Amended) A liquid recovery system for recovering a flowable substance from a surface or container, said system comprising at least:
 - a suction head in accordance with [any one of] claim[s] 1 [to 13] and,
 - a vacuum or negative pressure source coupled to said opposite end of said passage to provide a vacuum or suction source for drawing said substance through the slots and hold and directing the drawn substance to a waste collection or disposal means.

Please add new claims 19-28 as follows:

19. (New) A suction head for lifting a flowable substance from a surface, said suction head including at least:

a base for placement on the surface, the base having a radially outer peripheral edge;

a recess formed centrally in the base and having an outer edge inboard of said radially outer peripheral edge of said base;

a plurality of slots formed in said base extending from said radially outer peripheral edge of said base to said outer edge of said recess; and

a passage having one end that opens onto said recess and an opposite end adapted for connection to a vacuum source or a negative pressure source, said one end located inboard of said outer edge of said recess.

20. (New) The suction head according to claim 19, wherein said slots have a collective width substantially equal to or in the same order of magnitude as a diameter of said outer edge of said recess.

21. (New) The suction head according to claim 20, wherein said slots have a collective depth substantially equal to or in the same order of magnitude as the diameter of said one end of said passage.

22. (New) The suction head according to claim 21, wherein said recess includes a planar upper surface which is inclined relative to a horizontal reference plane.

23. (New) The suction head according to claim 23, wherein said upper surface has an incline in the order of 1:3.

24. (New) The suction head according to claim 23, wherein said one end of said passage opens onto said upper planar surface.

25. (New) The suction head according to claim 24, further including a filter supported in said base through which said flowable substance must pass when travelling from said slots into said passage.

26. (New) The suction head according to claim 25, further including an annular seat formed adjacent and radially outward of said outer edge of said recess.

27. (New) The suction head according to claim 26, wherein said filter is seated in said annular seat and said suction head further includes a retaining member for retaining said filter in said annular seat.

28. (New) The suction head according to claim 1, further including an impeller seated in said recess.

FLUID RECOVERY SUCTION HEAD5 Field of the Invention

The present invention relates to a suction head for lifting a flowable substance from a surface or container, and to a recovery system incorporating said suction head.

Background of the Invention

- 10 The present invention was developed to meet the challenge of developing an environmentally sound industrial cleaning system particularly for cleaning surfaces, such as the walls of buildings, roads of road like surfaces; machinery; vehicles etc.

- 15 Depending on the surface or item to be cleaned, a cleaning contractor may use a high pressure steam cleaner, high pressure water cleaner, or simply a hose using mains water pressure. The water, including detergents (if any) used in the cleaning and cleaning residues form waste water that flows over the ground to the nearest drain thus entering the drainage system. Depending on the nature of the drainage system, the waste water may be dumped to the ocean, leach into the ground, or be channelled to a water treatment system.

- 20 In any case, allowing the water to drain away can lead to unnecessary environmental degradation.

- 25 This has been recognised and some attempts have been made to recover the waste water or at least prevent it from entering the drainage system. For example, when cleaning cars or large vehicles, it is known to use a mat on which the vehicle is driven, the mat provided with a upstanding peripheral boarder so that water and detergents used during the cleaning collect on the mat and can then be pumped to a tank for transport to a water treatment site.

- 30 While these mats adequately perform their intended function, they are often difficult to handle because of their size and weight. Also, such mats are limited in use to situations where they can be placed underneath the items to be cleaned. Therefore, they have no use at all in a large variety of cleaning events for example, steam cleaning a parking lot or the walls of a building.

- 2 -

Summary of the Invention

It is an object of the present invention to provide a suction head and a recovery system incorporating said head that can be used to draw or recover a flowable substance such as a liquid from a surface.

According to a first aspect of the present invention there is provided a suction head for lifting a flowable substance from a surface, said suction head including at least:

a base for placement on the surface, the base having a radially outer peripheral edge;

a recess formed centrally in the base and having an outer edge inboard of said radially outer peripheral edge of said base, said recess provided with a planar upper surface which is inclined relative to a horizontal reference plane;

a plurality of slots formed in said base extending from said radially outer peripheral edge of said base toward and opening onto said recess; and

a passage having one end that opens onto said recess and an opposite end adapted for connection to a vacuum source or a negative pressure source, said one end located inboard of said outer edge of said recess.

Preferably, said slots extend in a radial direction.

Preferably, said slots have a collective width substantially equal to or in the same order of magnitude as a diameter of said outer edge of said recess.

Preferably, said slots have a collective depth substantially equal to or in the same order of magnitude as the diameter of said one end of said passage.

Preferably, said upper surface has an incline in the order of 1:3.

Preferably, said one end of said passage opens onto said upper planar surface.

Preferably, said suction head further includes filter means supported in said base through which said flowable substance must pass when travelling from said slots into said passage.

- 5 Preferably, said suction head further includes an annular seat formed adjacent and radially outward of said outer edge of said recess.

Preferably, said filter is seated in said annular seat and said suction head further includes a retaining means for retaining said filter in said annular seat.

10

Preferably, said retaining means is a clip or ring dimensioned to fit with a snap fit or an interference fit in said annular seat.

Preferably, said suction head further includes an impeller seated in said recess.

15

Preferably, said suction head further includes a non-return valve provided within, or in fluid communication with, said passage between said one end and a vacuum source or negative pressure source to which said suction head can be connected.

- 20 Preferably, said base is circular.

According to another aspect of the present invention there is provided a liquid recovery system for recovering a flowable substance from a surface or container, said system comprising at least:

- 25 a suction head in accordance with the first aspect of this invention; and,
a vacuum or negative pressure source coupled to said opposite end of said passage to provide a vacuum or suction source for drawing said substance through the slots and hole and directing the drawn substance to a waste collection or disposal means.

- 30 Preferably the waste collection or disposal means is a tank.

Preferably the system includes one or more transportable liquid barriers for laying on the

surface to form a substantial seal on the surface preventing passage of the substance thereunder, whereby, in use, one or more of said barriers can be placed at appropriate locations to block off drainage points on the surface, or configured to defined a liquid confinement area on the surface in which the head is placed.

5

Preferably each barrier comprises a tube made of a liquid impervious material and filled with a non-rigid ballast of a weight sufficient to hold the tube on the surface with a force sufficient to form a seal on the surface.

- 10 Preferably, said ballast is a particulate material. While preferably the ballast is sand.

Preferably, said tube is made from a rubber or rubber like material.

Description of the Drawings

- 15 An embodiment of the invention will now be described by way of example only with reference to the accompanying drawings in which:

Figure 1 is a plan view of an embodiment of the suction head in accordance with the present invention;

- 20 Figure 2 is an exploded transverse section view of the suction head depicted in Figure 1;

Figure 3 is a plan view of a second embodiment of the suction head;

Figure 4 is an exploded transverse section view of the suction head shown in Figure 3;

- 25 Figure 5 is a plan view of a third embodiment of the suction head;

Figure 6 is a plan view of an impeller incorporated in the suction head;

Figure 7 is a schematic representation of an embodiment of the suction head incorporating the impeller shown in Figure 6;

Figure 8 is a plan view of a fourth embodiment of the suction head; and

- 30 Figures 9A & 9B depict transportable liquid barriers that can be used in a liquid recovery system incorporating the suction head.

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Detailed description of preferred embodiments

Figures 1 and 2 depict a first embodiment of the suction head 10 for lifting a flowable substance such as water from a surface such as a roadway or parking lot. The suction head 10 includes a base 12 for placement on the surface. The base has a radially outer peripheral edge 14 which, in this instance, is in the configuration of a circle. A recess 16 is formed centrally in the base 12 and has an outer edge 18, which is inboard of the edge 14. A plurality of slots 20 are formed in the base 12 and extend from the edge 14 to the edge 18. The head 10 also includes a passage 22 having one end 24 in the form of a single hole that opens onto the recess 16. The hole 24 is located generally centrally in the recess 16 and inboard of the edge 18. An opposite end 26 of the passage 22 is adapted for connection to a vacuum source or a negative pressure source.

When the head 10 is connected via end 26 to a vacuum source and the base 12 placed on a surface bearing water the suction head 10 is able to draw water from the surface through the slots 20 into the recess 16 and through the passage 20 for discharge at a remove location.

The slots 20 are made of a depth D to form a barrier to the passage of foreign matter of a predetermined size through the slots 20 into the region 16 and subsequently through the passage 22. For example, the depth D may be in the order of 4 – 5 millimetres to prevent the ingress of foreign matter having a dimension greater than 5 millimetres. This would preclude items such as cigarette butts and stones of a greater size from passing through the slots 20.

A plurality of transversely extending holes 28 are provided in the suction head 10 between adjacent slots 20. The purpose of the holes 28 is to reduce the weight of the suction head 10.

The slots 20 have a collective (ie, cumulative) width W that is substantially the same as, and at least the same order of magnitude as diameter of outer edge 18 of the recess 16. Additionally, the slots have a collective (ie, cumulative) depth D that is substantially the same as or at least in the same order of magnitude as the diameter of the hole 24. Such

relative configuring of the slots 20 with the recess 16 and hole 24 optimise the efficiency of the suction head 10.

As is most apparent from Figure 2, the recess 16 is provided with an upper planar surface 32. The planar surface 32 lies in an inclined plane having a gradient in the order of 1:3.

An annular set 34 is formed adjacent to and radially outward from the edge 18. Seat 34 includes an outer circumferential face 36 that extends axially to form an inner radial edge 37 of slots 20. Edges 14 and 37 are coplanar and between them define an annular band in which the slots 20 are formed.

Due to the inclination of the surface 32 when the head 10 is in use, there will be a pressure gradient or differential across the recess 16. It is believed that this is beneficial in the operation of the head 10 by providing either a vortex action on the liquid being lifted, or a pulsating or diaphragm effect to assist in lifting the liquid from the surface.

To further assist in reducing the ingress of debris beyond a predetermined particle size through the passage 22, a filter 38 in the form of a mesh screen is placed in the recess 16 with the peripheral edges of the filter 38 resting on the seat 34. A locking ring or circlip 40 is disposed over the filter 38 to hold it within the recess 16. Any known arrangement can be used to mount the ring 40 to the head 10 such as, for example, forming the ring 40 to provide an interference fit against the face 36 or, forming the ring 40 as a circlip to seat inside a groove (not shown) formed about the face 36.

Figures 3 and 4 depict a second embodiment of the head 10' in which like reference numbers denote like features. The head 10' differs in the shape and configuration of the base 12 and most notably, is provided with only four slots 20 rather than eight as depicted in Figures 1 and 2. In a general sense, the head 10 is in the form of a plate whereas the head 10' has a general shape of a conical frustum with an extended constant diameter end.

Typically the head 10 will have a larger diameter than the head 10' and would be used in different applications. For example, the head 10 would typically be used for recovering say water from a parking lot whereas the head 10' may be used for recovering oil or petrol

from a drum, tank or other container.

Figure 5 depicts a further embodiment 10'' of the suction head. The embodiment 10'' differs in substance from the embodiment 10 by virtue of the configuration of the end 24 of the passage 22 that opens onto the recess 16. With the head 10'' the end 24 is configured as four separate holes 24' that are contained within a generally elliptical sub-area within recess 16. The purpose of providing four separate holes 24' is to assist in equalising pressure available to the slots 20.

10 In yet a further embodiment pictures in Figures 6 and 7, an impeller 42 is incorporate into the suction head 10'''. The impeller 42 has an annular periphery 44, which supports a plurality (in this case four) impeller blades 46. A plurality of ball bearings 48 are retained in and distributed about the periphery 44. The impeller 42 is seated on the seat 34. If the filter 38 is incorporated in the head the impeller 42 sandwiched between the filter 38 and the seat 34. The bearings 48 allow the impeller 42 to rotate about its axis. When a vacuum source or negative pressure source is attached to the passage 22, the impeller 42 is caused to rotate by virtue of a pressure differential. The purpose of the impeller 42 is to also assist in equalising pressure distribution to the slots 20.

20 Figure 8 depicts a further embodiment of the suction head 10'''. This embodiment differs from that depicted in Figure 5 in substance by the shape of the outer peripheral edge 14 of the head. In this embodiment, the peripheral edge 14 is of octagonal shape thereby providing eight straight edges about the periphery of the head 10'''. This embodiment may be particularly useful for use as a head in a wet or steam carpet cleaning system where it is often desirable to have square edges on the suction head in order to enable cleaning of a carpet adjacent a wall.

The embodiment of the suction head depicted in Figures 1 – 8 can form part of a larger liquid recovery system for recovering liquid from a surface or container. The liquid recovery system includes the suction head 10 and a vacuum source, negative pressure source or pump that is coupled at its suction end to the passage 22. The liquid recovery system would also include one or more transportable liquid barriers 50 as shown in

Figures 8A and 8B, for laying on a surface to form a substantial seal on the surface to prevent the passage of water thereunder. In this way, one or more of the barriers 50 can be used to block off natural or artificial drainage points, or to be configured to define a liquid confinement area on the surface on which the head 10 is place. Each barrier 50 comprises a tube 52 of liquid impervious, and preferably flexible material filled with a non-rigid ballast 54 of a sufficient weight to hold the tube 52 on the surface with sufficient force to form a seal on the surface. Ideally, the ballast 54 is in the form of a particulate material such as sand. End caps (not shown) are placed at each end of the tubes 52 to seal the ends and prevent ingress of liquid into the ballast 54.

The barriers 50 can be easily manipulated into any desired shape. They can also be made to any length, although it is envisage that they would be made of one or two standard lengths, for example three meters and six meters. In this way a plurality of barriers 50 can be placed in a slightly overlapping end to end arrangement to form a liquid barrier of a required shape and/or configuration. A particularly suitable material from which the tube 52 can be made is polyethylene rubber or SBR latex, preferably having a wear and chemical resistant skin.

Now that embodiments of the present invention have been described in detail it will be apparent to those skilled in the appropriate arts that numerous modifications and variations may be made without departing from the basic inventive concepts. For example, the suction heads 10, 10', 10'' and 10''' are depicted as having a base 12, which is of a circular shape. However, the base can be made in other shapes. Also, a non-return valve can be placed in the passage 24, which allows flow in the direction from hole 24 to end 26 but prevents a flow in the reverse direction. The head 10 can be made from a wide variety of materials depending on the intended application. For example, 301 stainless steel or titanium is ideal if the head 10 is to be used in a corrosive environment. However, plastics materials may also be used in the construction of the head 10 say for example when used in relation to water.

Further, while the above description describes use of the head 10 in relation to the recovery of liquid it can be used for the recovery of other flowable substances such as

particulate materials and powders, for example, cereal grains such as wheat or rice. When used in such embodiments, the filter 38 may be removed or at least configured to ensure that the desired particles can pass therethrough.

- 5 All such modifications and variations together with others that would be obvious to a person of ordinary skill in the art are deemed to be within the scope of the present invention the nature of which is to be determined from the above description and the appended claims .

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CLAIMS

The Claims Defining the Invention as are Follows:

1. A suction head for lifting a flowable substance from a surface, said suction head
5 including at least:

a base for placement on the surface, the base having a radially outer peripheral
edge;

a recess formed centrally in the base and having an outer edge inboard of said
radially outer peripheral edge of said base, said recess provided with a planar upper
10 surface which is inclined relative to a horizontal reference plane;

a plurality of slots formed in said base extending from said radially outer
peripheral edge of said base to said outer edge of said recess; and

a passage having one end that opens onto said recess and an opposite end adapted
for connection to a vacuum source or a negative pressure source, said one end located
15 inboard of said outer edge of said recess.

2. The suction head according to claim 1, wherein said slots have a collective width
substantially equal to or in the same order of magnitude as a diameter of said outer edge of
said recess.
20

3. The suction head according to claim 2, wherein said slots have a collective depth
substantially equal to or in the same order of magnitude as the diameter of said one end of
said passage.

25 4. The suction head according to claim 3, wherein said upper surface has an incline in
the order of 1:3.

5. The suction head according to any one of claims 1 to 4, wherein said one end of
said passage opens onto said upper planar surface.
30

6. The suction head according to anyone of claims 1 to 5, further including filter
means supported in said base through which said flowable substance must pass when

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travelling from said slots into said passage.

7. The suction head according to anyone of claims 1 to 6, further including an annular seat formed adjacent and radially outward of said outer edge of said recess.

8. The suction head according to claim 7, wherein said filter is seated in said annular seat and said suction head further includes a retaining means for retaining said filter in said annular seat.

9. The suction head according to claim 8, wherein said retaining means is a clip or ring dimensioned to fit with a snap fit or an interference fit in said annular seat.

10. The suction head according to anyone of claims 1 to 9, further including an impeller seated in said recess.

11. The suction head according to anyone of claims 1 to 10, further including a non-return valve provided within, or in fluid communication with, said passage between said one end and a vacuum source or negative pressure source to which said suction head can be connected.

12. The suction head according to anyone of claims 1 to 11, wherein said base is circular.

13. The suction head according to anyone of claims 1 to 12, wherein said slots extend in a radial direction.

14. A liquid recovery system for recovering a flowable substance from a surface or container, said system comprising at least:

a suction head in accordance with any one of claims 1 to 13 and,

a vacuum or negative pressure source coupled to said opposite end of said passage to provide a vacuum or suction source for drawing said substance through the slots and hole and directing the drawn substance to a waste collection or disposal means.

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15. The system according to claim 14, further including one or more transportable liquid barriers for laying on the surface to form a substantial seal on the surface preventing passage of the substance thereunder, whereby, in use, one or more of said barriers can be placed at appropriate locations to block off drainage points on the surface, or configured to defined a liquid confinement area on the surface in which the head is placed.
16. The system according to claim 15, wherein each barrier comprises a tube made of a liquid impervious material and filled with a non-rigid ballast of a weight sufficient to hold the tube on the surface with a force sufficient to form a seal on the surface.
17. The system according to claim 16, wherein said ballast is a particulate material.
18. The system according to claim 17, wherein said tube is made from a rubber or rubber like material.

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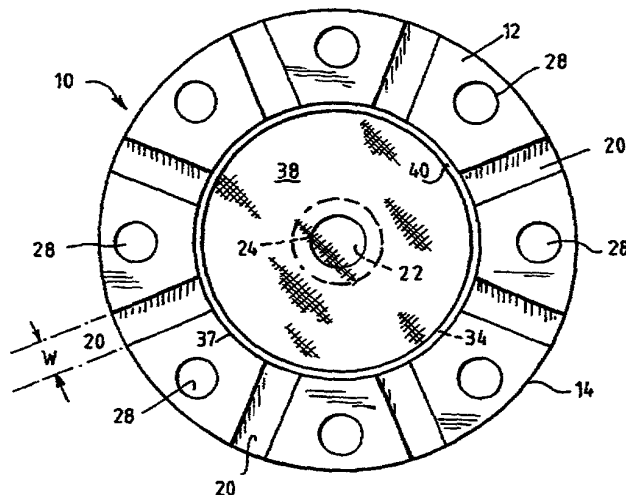
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(54) Title: FLUID RECOVERY SUCTION HEAD



(57) Abstract: A suction head (10) for lifting a flowable substance such as water, from a surface includes a base (12) for placement on the surface. The base (12) has a radially outer peripheral edge (14) in the shape of a circle. Recess (16) is formed centrally in the base (12) and has an outer edge (18) that is inboard of the edge (14), a plurality of slots (20) are formed in the base (12) and extend from edge (14) to edge (18), head (10) also includes a passage (22) having one end (24) that opens onto recess (16) and an opposite end (26) adapted for connection to a vacuum source or negative pressure source. Recess (16) has an upper planar surface (32) that is inclined relative to a horizontal reference plane. The slots (20) have a collective footprint area that is substantially the same as, or at least in the same order of magnitude as the footprint area of the recess (14). Further, the collective depth (D) of the slots (20) is substantially the same as or at least in the same order of magnitude as the diameter of hole (24).

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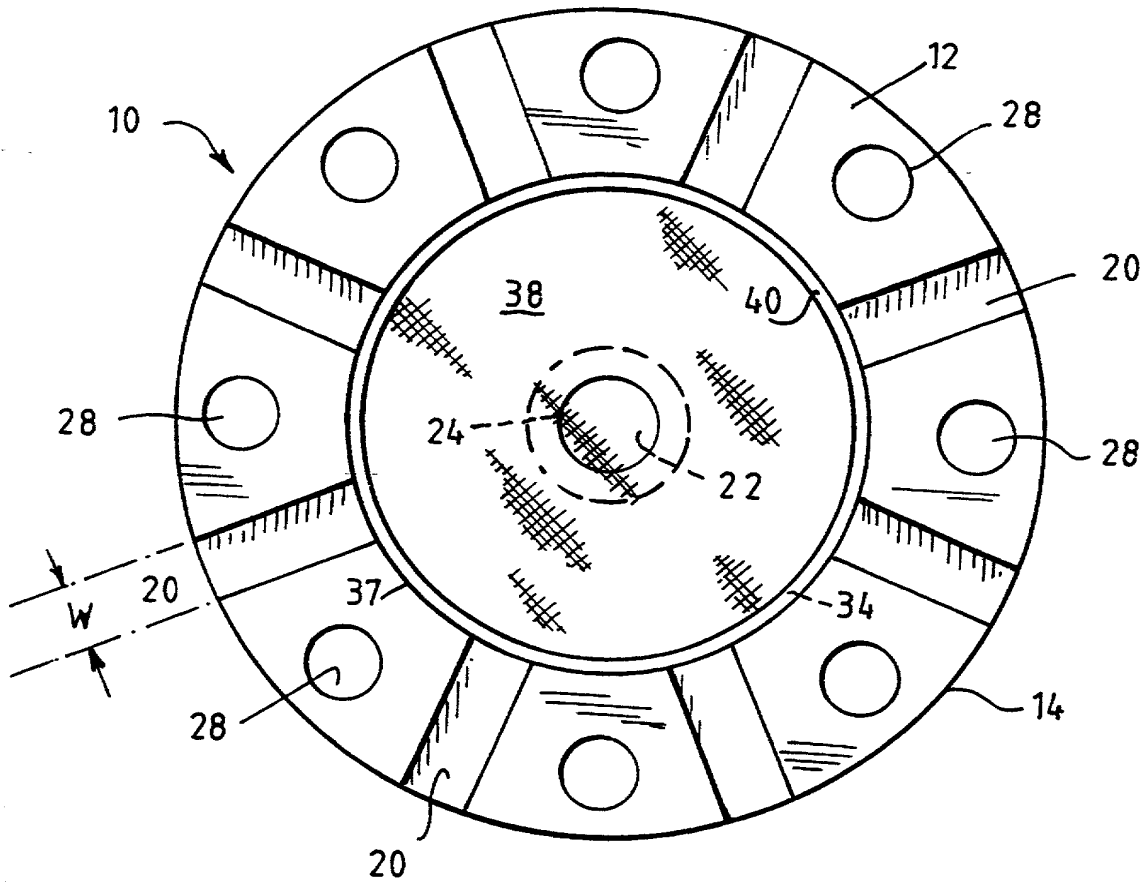


FIG. 1.

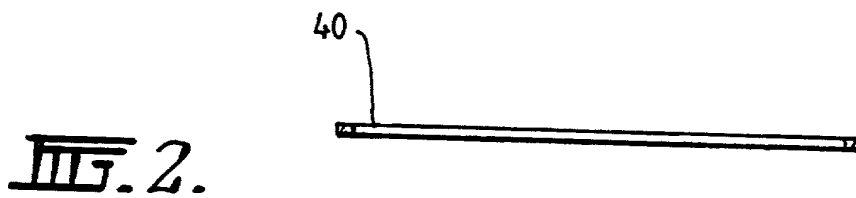
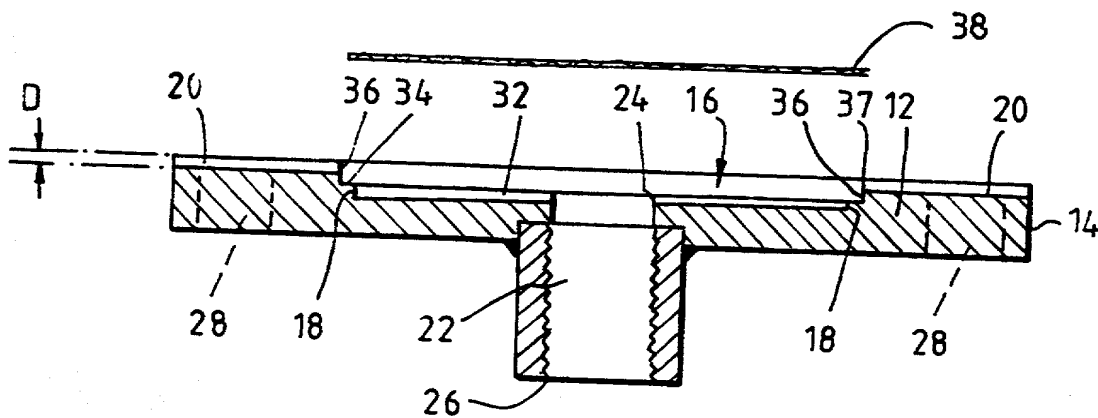


FIG. 2.



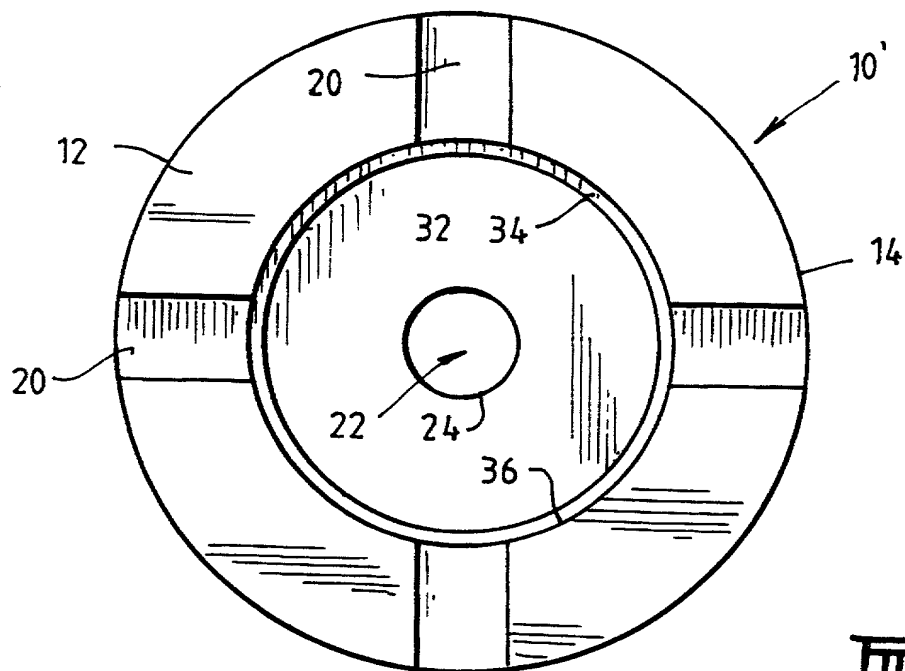


FIG. 3.

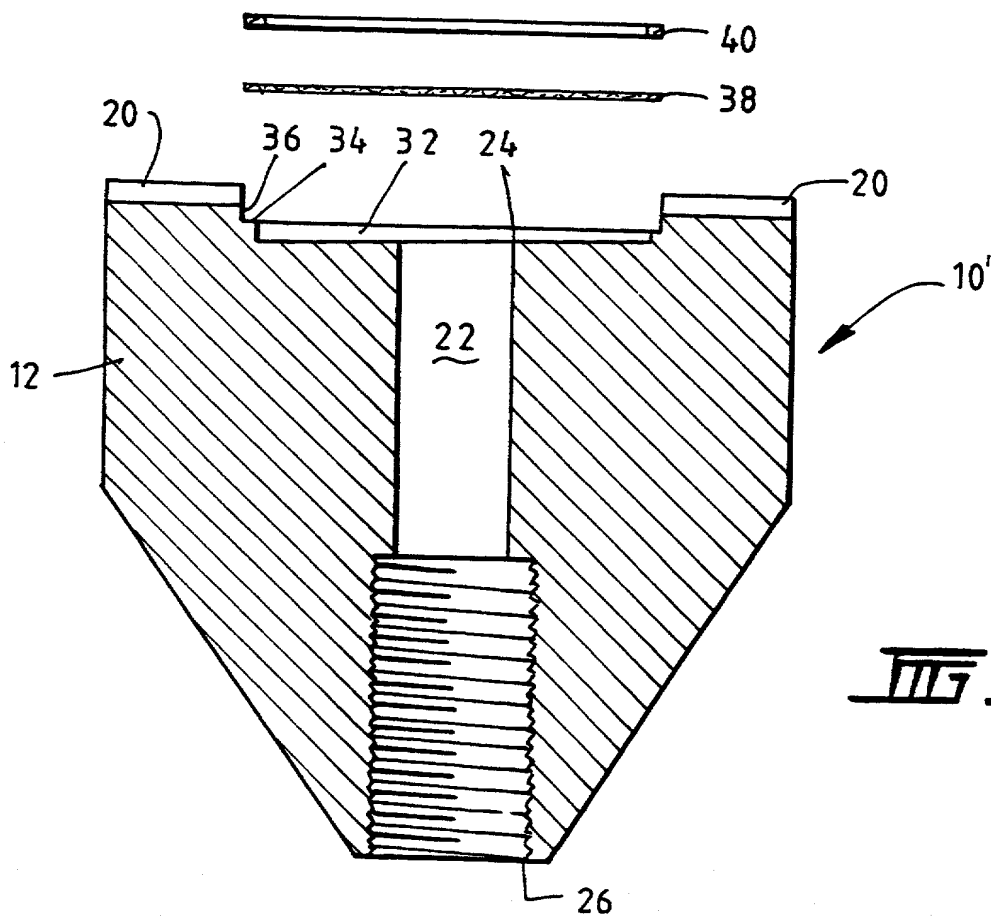


FIG. 4.

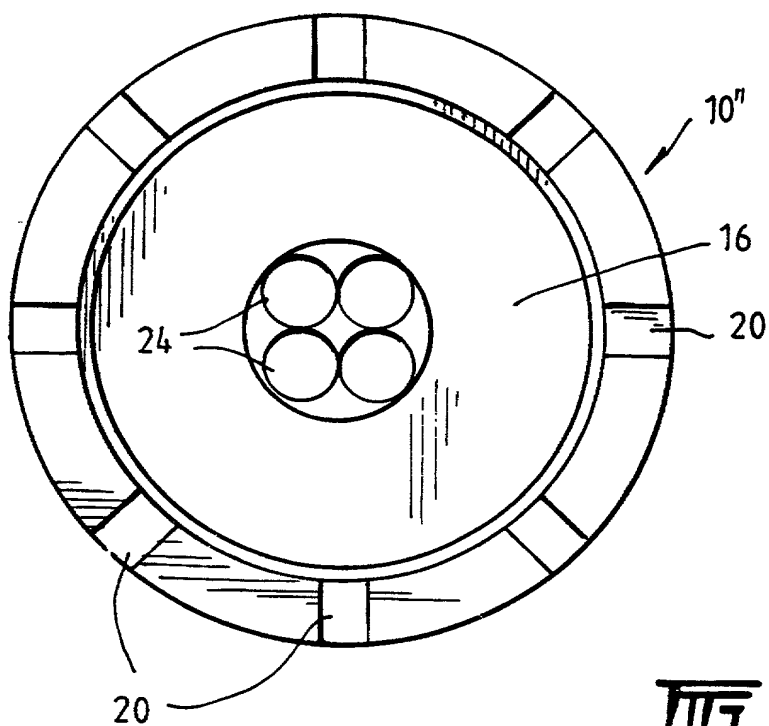


FIG. 5.

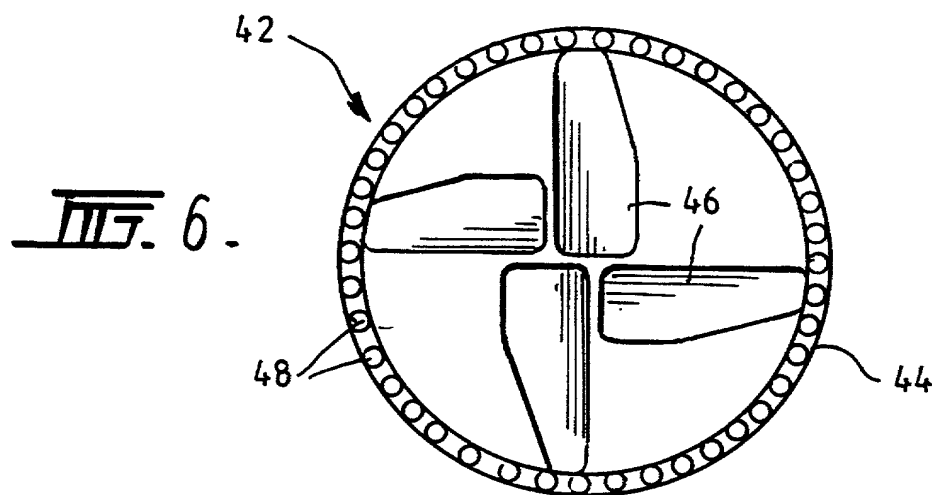


FIG. 6.

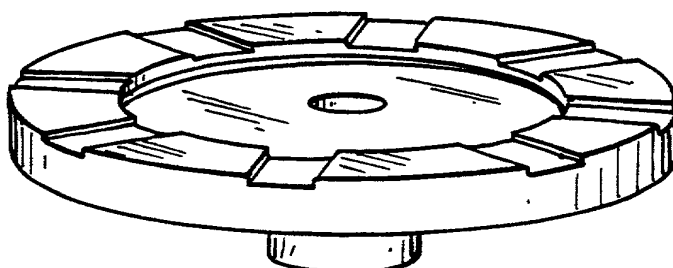


FIG. 7.

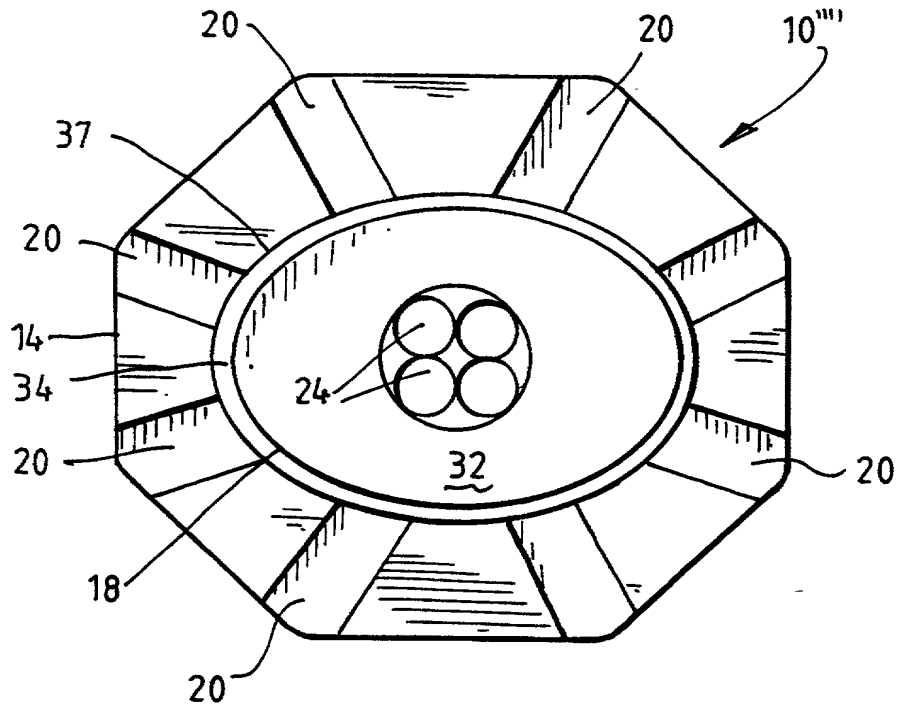


FIG. 8.

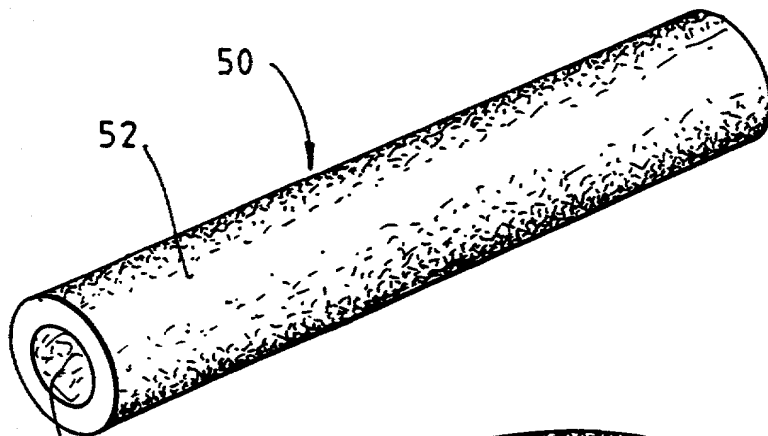


FIG. 9a.

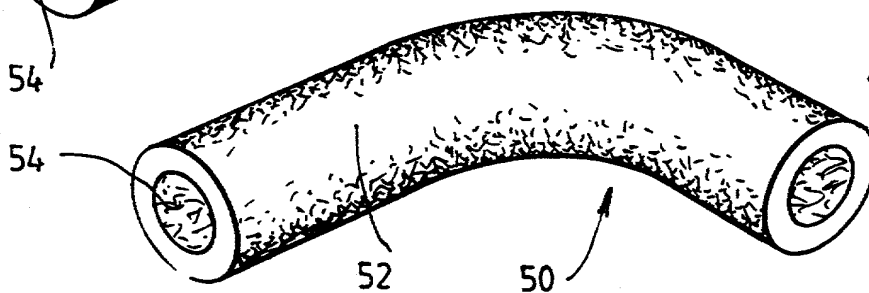


FIG. 9b.

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Examiner Name		

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I believe I am the original and first inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled:

FLUID RECOVERY SUCTION HEAD

(Title of the invention)

the specification of which

☐ is attached hereto

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02/28/2002

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